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Alaska Subsistence Salmon Fishing Regulations Database, 1960-2001— Kuskokwim and Yukon Fisheries Management Areas

Final Report No. FIS01-010

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Final Report Summary Page

Title: Regulatory History of Alaska Subsistence Salmon Fishing Regulations—Yukon and Kuskokwim Management Areas

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Investigator(s)/Affiliation(s): Elizabeth Andrews/Private Contractor; and Gretchen B. Jennings/Alaska Department of Fish and Game, Division of Subsistence

Management Regions: Yukon River Region and Kuskokwim River Region

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Abstract: This study produced a searchable database on a single compact disk (CD-ROM) of subsistence salmon fishing regulations in Alaska for the Yukon and Kuskokwim fisheries management areas from 1960 through 2001. The searchable database in Access2000 allows the user to use one of three search features—text search, quick search, and numerical administrative code search—to produce a chronological listing of regulations in effect in any one year from 1960 through 2001. A user's manual is included also. The user can also search the actual regulations booklets for the same years by searching portable document format files that are also part of the database on the CD-ROM. The report that accompanies the database describes information on developing and using the database, an overview of subsistence salmon fishing patterns in each area, and recommendations for future work. The database can be expanded by adding the same information for other fisheries management areas in the state; and the structure and format is in place to create similar databases of federal subsistence fisheries and wildlife regulations.

Key Words: Alaska, fishing regulations, history, Kuskokwim River, Kuskokwim drainage, regulations, salmon fisheries, salmon fishing, subsistence fisheries, subsistence fishing, Yukon River, Yukon drainage

Data Information: *Description* - Data for this study include Alaska state subsistence salmon fishing regulations from 1960 through 2001 for the Yukon and Kuskokwim River drainages. *Format* - Data are stored in Microsoft Access databases. *Custodian(s)* - Data are available on CD-ROM at the U.S. Fish and Wildlife Service, Office of Subsistence Management, 3601 C Street, Anchorage, Alaska 99503 and Data Management Support, Division of Subsistence, Alaska Department of Fish and Game, 333 Raspberry Road, Anchorage, Alaska 99518 which

also maintains the database. *Availability* -- Data are available on CD-ROM upon request to the custodians.

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EXECUTIVE SUMMARY

The Yukon and Kuskokwim River regions both have identified fisheries monitoring (specifically, the impact of certain regulatory changes) as an issue of regional regulatory concern. The history of regulations for fisheries provides important contextual information for considering and evaluating management plans and regulatory proposals; and provides a basis for documenting external influences, specifically government regulation, on the conduct of subsistence fisheries. A regulation review serves as a foundation necessary for evaluating the impacts of various regulations on subsistence harvests. It also is necessary to review the conservation elements of regulatory regimes and their ability to provide for customary and traditional uses of salmon. The success and failure of different regulatory regimes to meet a conservation mandate and to provide for subsistence uses can be evaluated once a regulation review has been completed.

The project used archival research methods for examining published regulations to develop and produce the searchable database. From the source materials that contained the regulations for the Yukon and Kuskokwim fisheries management areas, search features were developed to sort regulations by title, section, paragraph, year, region (fisheries management area), salmon species, gear type, and text (any work or group of words). A user interface was designed for the "search screens" to allow the user to easily search and extract information. In this way, the user can reconstruct the subsistence salmon fishing regulations in effect for any year for the Yukon or Kuskokwim salmon fisheries.

The result is a searchable database on a single compact disk (CD-ROM) that can be used on a personal computer using Access2000. It includes subsistence salmon fishing regulations in Alaska for the Yukon and Kuskokwim fisheries management areas from 1960 through 2001 By using one of three search features—text search, quick search, and numerical administrative code search—the user can produce a chronological listing of regulations in effect in any one year from 1960 through 2001. A "user's manual" is included also. The user can also search the actual regulations booklets for the same years by searching the portable document format files that are also part of the database on the CD-ROM.

The report that accompanies the database describes information on developing and using the database; a chronology of subsistence fishing definitions in regulation since 1960; an overview of subsistence salmon fishing patterns in each area; and recommendations for future work.

As a result of this study, two major opportunities exist for additional work to aid fisheries management and to provide for subsistence use. First, the database structure developed can now be used for creating a database covering other areas of the state as well as federal subsistence regulations. The pdf files can be easily expanded to include all regulations with little time investment. Second, the database now provides information that can be used to analyze the opportunities for and restrictions to subsistence salmon fishing in the Yukon and Kuskokwim drainages since 1960.

INTRODUCTION

This report is a supplement to the searchable computerized database that contains the Alaska state subsistence salmon fishing regulations from 1960 through 2001 for the Yukon and Kuskokwim River drainages—a CD-ROM titled "Alaska Subsistence Salmon Fishing Regulations Database." This project was funded by the U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Information Service (FIS Project 01-010).

The primary purpose of this report is to describe the work that produced the searchable database. A secondary purpose is to provide an overview of the chronology and history of subsistence salmon fishing regulations for the Yukon and Kuskokwim River drainages (Figures 1, 2, and 3). The investigation plan described the following issue to be addressed by the project:

> The Yukon and Kuskokwim River regions both have identified fisheries monitoring (specifically, the impact of certain regulatory changes) as an issue of regional regulatory concern. The history of regulations for fisheries provides important contextual information for considering and evaluating management plans and regulatory proposals; and provides a basis for documenting external influences, specifically government regulation, on the conduct of subsistence fisheries. A regulation review serves as a foundation necessary for evaluating the impacts of various regulations on subsistence harvests. It also is necessary to review the conservation elements of regulatory regimes and their ability to provide for customary and traditional uses of salmon. The success and failure of different regulatory regimes to meet a conservation mandate and to provide for subsistence uses can be evaluated once a regulation review has been completed. The results of the project will aid non-governmental organizations, state and federal agencies, and regional advisory councils in developing and analyzing new regulations.

OBJECTIVES

The investigation plan defined two objectives for the project:

1. To compile a chronological history of subsistence salmon fishing regulations since Alaska statehood by fishing districts within and adjacent to federal conservation units of the Yukon River drainage and Kuskokwim River drainage in terms of gear; fishing times; and methods and means.

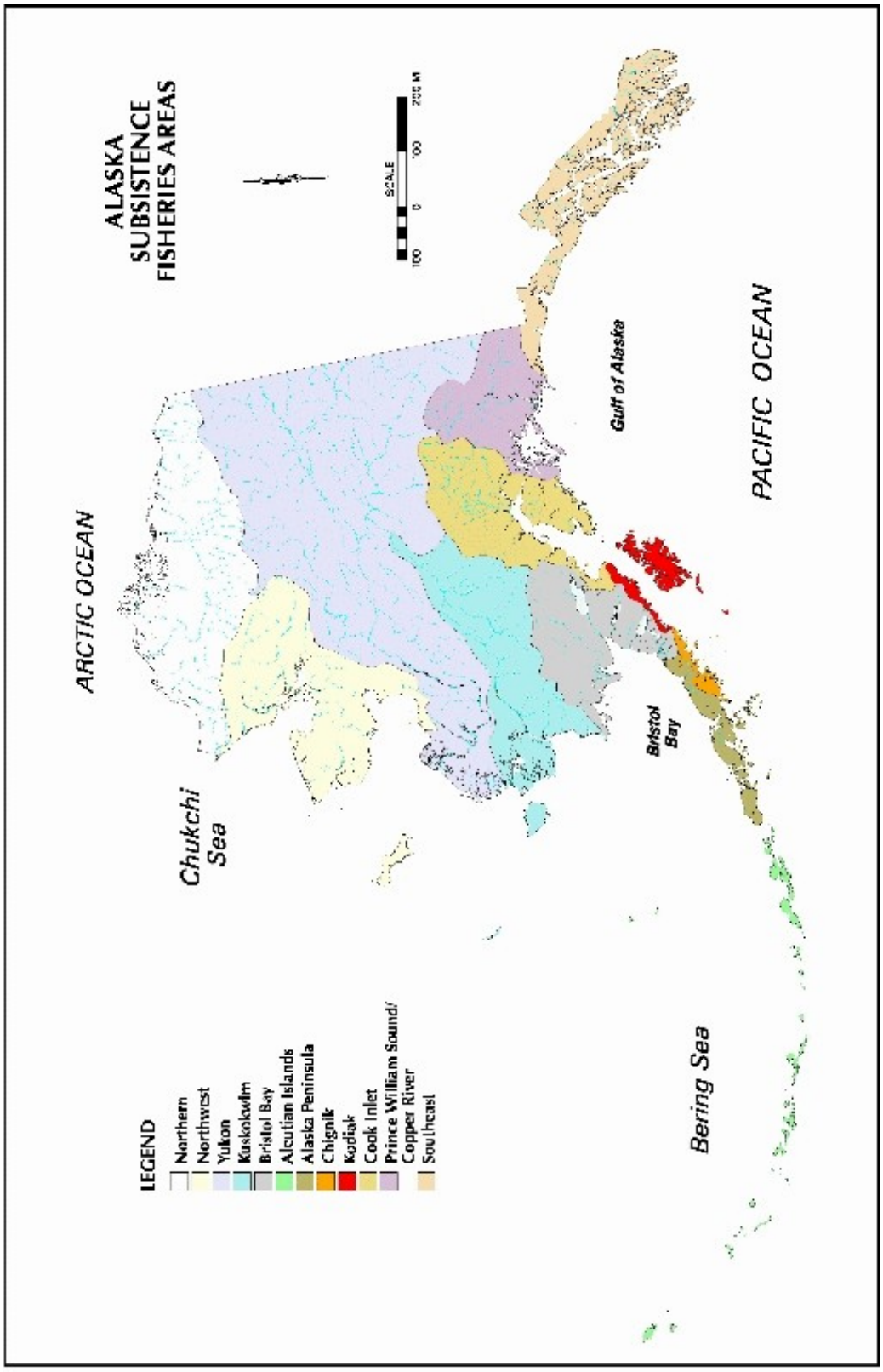


Fig. 1 Map of state fisheries management areas

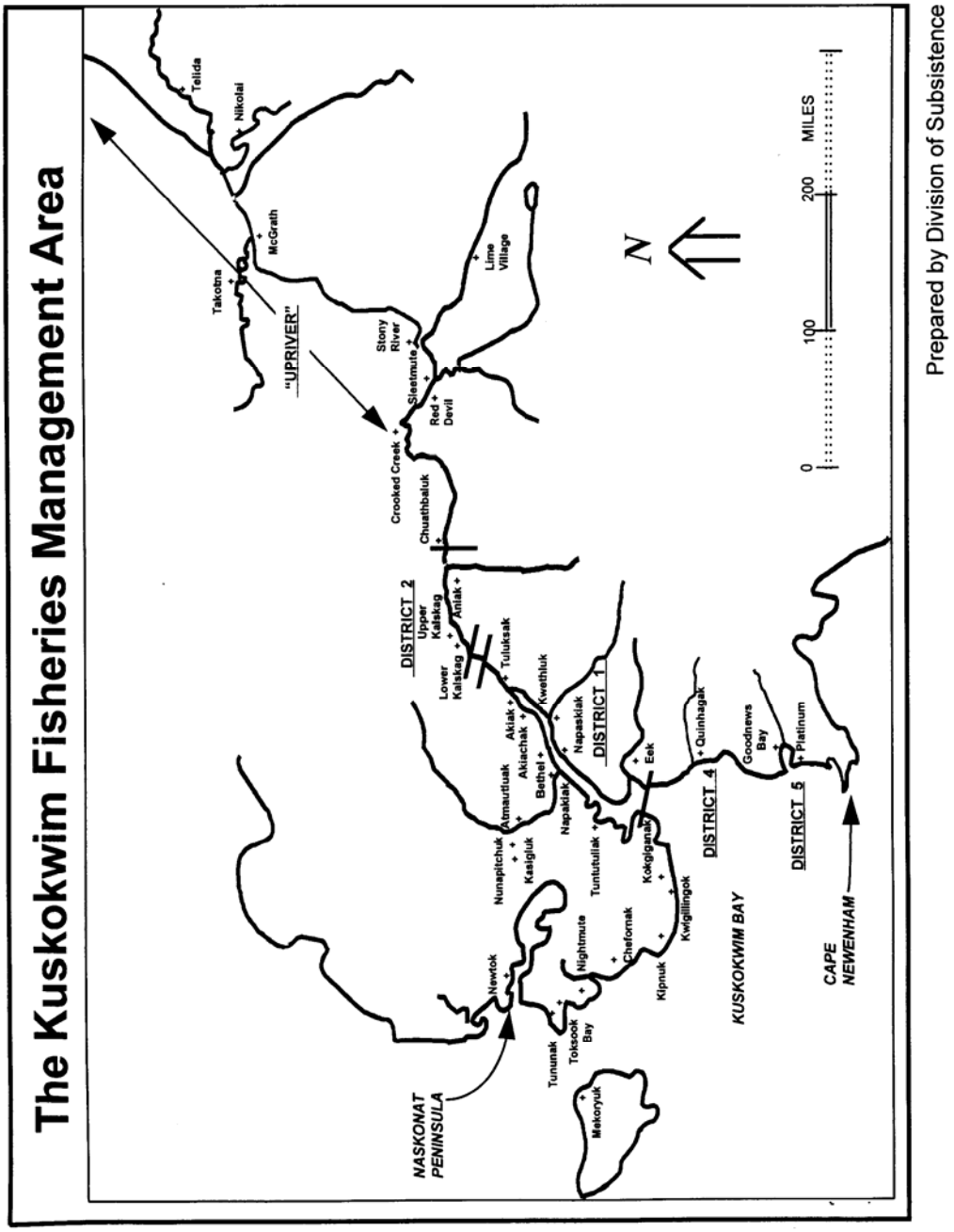
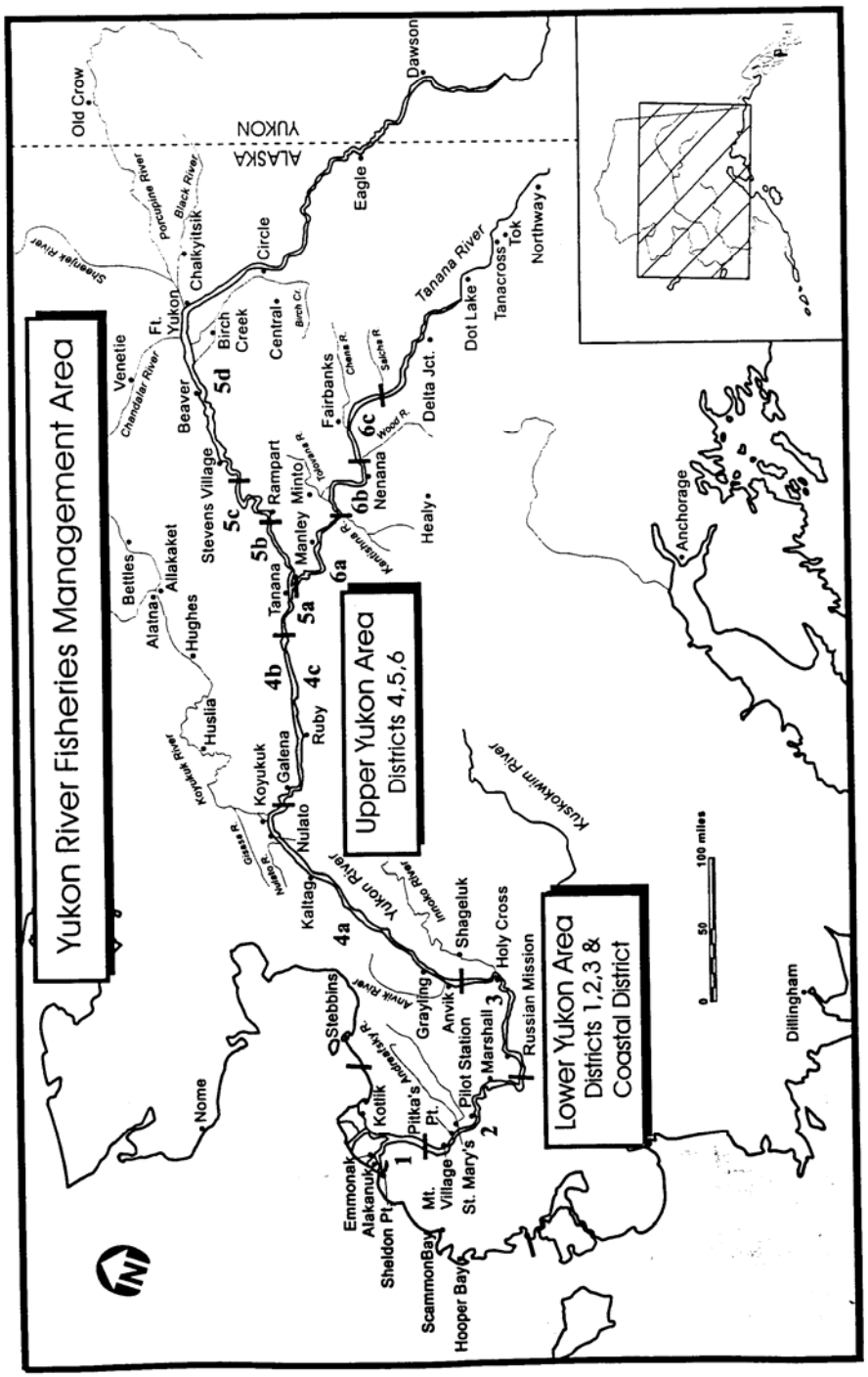


Fig. 2. Kusko map



The Yukon Area showing communities and fishing districts, 2000.

Fig. 3. Yukon map

2. To provide an overview of recent subsistence salmon fishing patterns in each area in terms of customary fishing times and gear, as derived from subsistence fishing studies. The purpose of this objective is to provide a qualitative description of the general subsistence fishing patterns in an area.

The project was a collaborative effort between the private contractor and the Alaska Department of Fish and Game (ADF&G), Division of Subsistence, Data Management Support. The project focused first on the primary objective to ensure the production of searchable database on CD-ROM; and the second objective was accomplished subsequently for inclusion in this report. A user's manual was prepared also to provide end-users with navigational techniques for searching the database. Several case examples were used to demonstrate how to effectively use the search options.

The overview of subsistence salmon fishing patterns characterizes the magnitude of subsistence salmon fishing in each region derived from annual harvest surveys. This section also uses case examples of community fishing patterns derived from in-depth field research in communities to provide descriptions of salmon fishing representative of communities within the Kuskokwim and Yukon River drainages. In addition, an overview of salmon fisheries management in Alaska is included to provide some historical context for understanding the role of commercial fisheries on subsistence fisheries management.

METHODS

This project used archival research methods for examining published regulations to accomplish the primary objective of the study as noted above. The baseline for the database was the 2001-2002 Alaska Administrative Code, Title 5 (Fish and Game), Register 158, Chapter 01 (Subsistence Finfish Fishing), Article 1 (Statewide Provisions), Article 4 (Yukon-Northern Area), and Article 5 (Kuskokwim Area); Chapter 05 (Yukon-Northern Area, Article 1 (Description of Area); Article 2 (Fishing Districts and Subdistricts) and Article 3 (Salmon Fishery); and Chapter 07 (Kuskokwim Area), Article 1 (Description of Area), Article 2 (Fishing Districts) and Article 3 (Salmon Fishery).

The source for these records in electronic format was the "infobase" of the Legislative Reference Library of the Alaska State Legislature. This infobase is a single-file electronic repository for large volumes of dynamic reference information that is primarily free-format or semi-structured. This file served as the baseline developing the searchable computerized database produced for this project.

Because the infobase type of reference information is not well suited for traditional databases, data were converted first into Microsoft Excel spreadsheets. Next, regulations from prior years (1960-2001) were entered into the spreadsheet format. Microsoft Access 2000 was used to structure the data into a relational database, so it could be searched using a "quick search"

feature for salmon species, gear type, year, and region; or a "text search" using a word or group of words. Another search is possible using the Alaska Administrative Code numbering for Title 5 (Fish and Game) to produce regulation histories defined by the user.

The source material for the 1960-2001 regulations was the printed regulations booklets prepared for informational use to the public. Information in these booklets is derived from the official regulations in the Alaska Administrative Code as filed with the Lieutenant Governor. While omissions and changes may have occurred after the booklet was printed, the database includes all years, so that changes between years can be viewed. Changes in regulations and wording of regulations were added from year to year, as well as the beginning and ending year for each regulation. Information from these booklets was organized and consolidated into easily manipulated Excel worksheets.

Subsequently, we developed the structure of the main data files for the database within Microsoft Access 2000. The tables contain the required variables to sort regulations by title, section, paragraph, year, region (fisheries management area), salmon species, gear type, and text (any word or group of words). Next, we developed a user interface for this searchable historical database and designed it to provide easy searching and extraction of information. We tested the search capability of the data set to sort regulations. Use of the appropriate sorts allows the user to reconstruct the subsistence salmon fishing regulations in place at any time for the Yukon or Kuskokwim fisheries management area or "region" (the quick-search term used in the database). Another opening screen shows the entire contents of the database, provides a brief description of each part of it, and provides links that allow the user to quickly access any part of the database.

The database also includes in portable document format (pdf) all regulations booklets for the years 1960-2001 for the Yukon and Kuskokwim fisheries management areas that contain regulations on subsistence salmon fishing (Alaska Department of Fish and game 1960-2001) (see Appendix 1). The opening screen describes the contents of the database. The user can readily see in the booklets the complete set of regulations that was printed for public information. This use of the portable document format (pdf) also makes the booklets searchable by keyword or phrase. The database we developed includes the searchable database and the pdf files, both of which are on a single CD-ROM.

Both the searchable database and pdf files were designed to be readily "expandable." Fishing regulations for future years and other fisheries management areas can be added, since the search engine and formats are established.

The secondary objective of the study was accomplished also using archival and library research as the main information gathering methods. The primary author reviewed all subsistence research reports in the Technical Papers Series of the Alaska Department of Fish and Game, Division of Subsistence, for information on the salmon fishing patterns in the Yukon and Kuskokwim River drainages. Two case examples, derived from community subsistence studies in each drainage, were selected to provide a representation of fishing patterns along the Kuskokwim and Yukon rivers. These examples describe customary fishing times, gear, per capita salmon harvests, and how communities accomplish the summer salmon harvest.

RESULTS

Subsistence fishing regulations have been in place since the State of Alaska began management of fisheries following statehood in 1957. The first published regulations appeared in the state's code in 1960 and provisions for subsistence fishing have continued since then (Table 1). Specific regulations noted in statewide provisions and for the Yukon and Kuskokwim fisheries management areas were the subject of this study.

This project resulted in the following products:

(1) A searchable database on CD-ROM titled "Alaska Subsistence Salmon Fishing Regulations Database, 1960-2001—Yukon and Kuskokwim Fisheries Management Areas." This contains the searchable database in Microsoft Access 2000 and portable document format (pdf) files of regulations booklets for each year 1960 through 2001, which are also searchable using the Adobe Acrobat Reader software program.

(2) A user's manual to demonstrate to end-users how to effectively navigate the database and perform different types of searches. Case examples are used in the manual to show actual examples of typical searches used by researchers.

(3) This report which is also contained on the CD-ROM database described above.

Regulations Database

The database is comprised primarily of one main table and a support table created in Microsoft Access 2000. The main table holds the regulations from 1960 through 2001. The support table is used for sorting regulations by region. Another table is used to sort regulations by year, text, or "quick search" selection (salmon species, fishing gear type, year, or region). On the opening search screen, we created an option to "quit to Access 2000," so users have the ability to export data from the tables to most commonly used file structures, including .dbf files, Excel spreadsheet files, or text files to create tables of specified information. We used data field names that are compatible with the Alaska Subsistence Fisheries Database (FIS Report No. 00-017) (Brown, Caylor, Jennings and Utermohle 2001), the Community Profile Database (Brown, Jennings, Scott, and Utermohle 2001), and the Historic Subsistence Salmon Harvest Database (Utermohle and Brown 2001). To use the database, the user needs 140 MB on the C:/ drive of the computer, the Microsoft Access 2000 program, and Adobe Acrobat Reader version 4.0 or higher.

TABLE 1. Subsistence Fishing defined in Alaska Statute and Regulations, 1960-2001.

1960	"Subsistence fishing"—the taking of or attempting to take any species of fish or shellfish for purposes other than sale or barter, except as provided for in Sport Fishing Regulations for the Department. (Part 101.01(n)).
1960-68	Salmon may be taken for subsistence purposes only by residents. (Part 102.91(a)).
1961-68	"Subsistence fishing"—the taking or attempting to take any species of fish or shellfish for purposes other than sale or barter, except as provided for in Sport Fishing Regulations of the Department; and also, includes the taking of fish in the Arctic area for dried dog food. (Part 101.01(n)).
1969-72	"Subsistence fishing" means the taking or attempting to take any species of fish or shellfish for purposes other than sale or barter, except as otherwise provided in this title and also includes the taking of fish in the Arctic-Yukon-Kuskokwim area for dried dog food. (5 AAC 39.975(12)).
1969-75	Salmon may be taken for subsistence purposes only by residents. (5 AAC 39.890(a)).
1973-75	"Subsistence fishing" means the taking or attempting to take any species of fish or shellfish for purposes other than sale or barter. (5 AAC 39.975(12)).
1976-78	"Subsistence fishing" means the taking, fishing for, or possession of fish, shellfish, or other fishery resources for personal use and not for sale or barter except as otherwise provided in this title. (5 AAC 39.975(12)).
1976-78	Salmon and halibut may be taken for subsistence purposes only by residents. (5 AAC 39.890(a)).
1978	Subsistence fishing" means the taking, fishing for, or possession of fish, shellfish, or other fishery resources for personal use and not for sale or barter, with gill net seine, fish wheel, long line, or other means defined by the Board of Fisheries. (AS 16.05.940(17)).
1979-86	"Subsistence fishing" means the taking of, fishing for, or possession of fish, shellfish, or other fisheries resources for subsistence uses with gill net, seine, fish wheel, long line, or other means defined by the Board of Fisheries. (AS 16.05.940(30)).
1987-2001	"Subsistence fishing" means the taking of, fishing for, or possession of fish, shellfish, or other fisheries resources by a resident domiciled in a rural area of the state for subsistence uses with gill net, seine, fish wheel, long line, or other means defined by the Board of Fisheries. (AS 16.05.940(30)).

To use the historical regulations database, the user can simply click on a button to select species, gear type, year, or region to search for the regulations that were in effect. A text search feature also allows the user to type in a word or group of words to search for regulations by year or years and/or by region or regions (Figs. 4 and 5).

The CD-ROM also contains in portable document format (PDF) Alaska state subsistence and commercial fishing regulations for the years 1960 through 2001 as printed in booklets that were available free-of-charge to the general public (Appendix 1). These can be accessed through the "contents" screen on the database using the Adobe Acrobat Reader software program version 4.0 or higher. The regulations contained in the database are primarily for the salmon fisheries of the Yukon and Kuskokwim River drainages. For the years 1979 through 2001, the files may contain only those regulations pertaining to the salmon fisheries of the Yukon and Kuskokwim management areas, rather than the entire state, as the booklets were printed on a regional rather than statewide basis. For these years, subsistence shellfish regulations are not included, nor are regulations for other finfish, such as herring, halibut, and other non-salmon subsistence fisheries. For the years 1960 through 1978 the regulations for the entire state were included in the booklets, so regulations for those years pertain to all fisheries throughout the state.

For the pdf files, a separate file exists for each regulation booklet. The search screen for the booklets shows each year, the exact title, and number of pages in the file, file name, and file size. The user selects a booklet by simply clicking on the title (see Appendix 1). The PDF files are searchable by text (word or group of words) using the Adobe Acrobat Reader program. The pdf files on the CD-ROM also include maps of the fisheries management areas and this report.

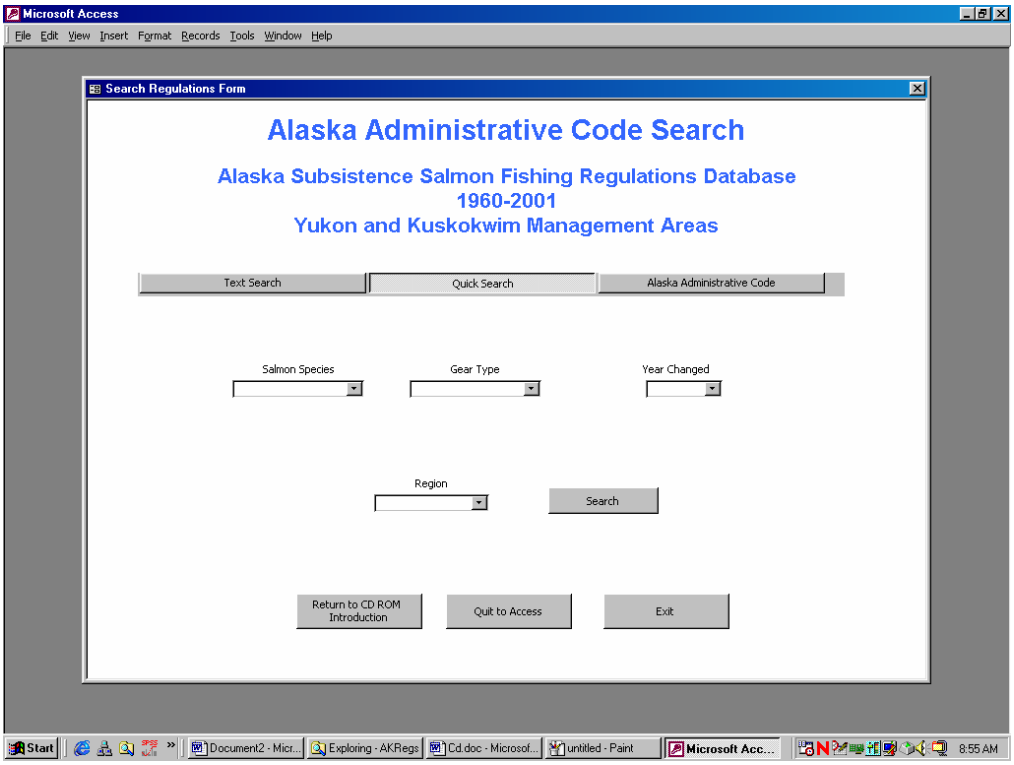


Fig. 4. Example of Opening Search Screen for the "Alaska Subsistence Salmon Fishing Regulations Database" in Microsoft Access 2000.

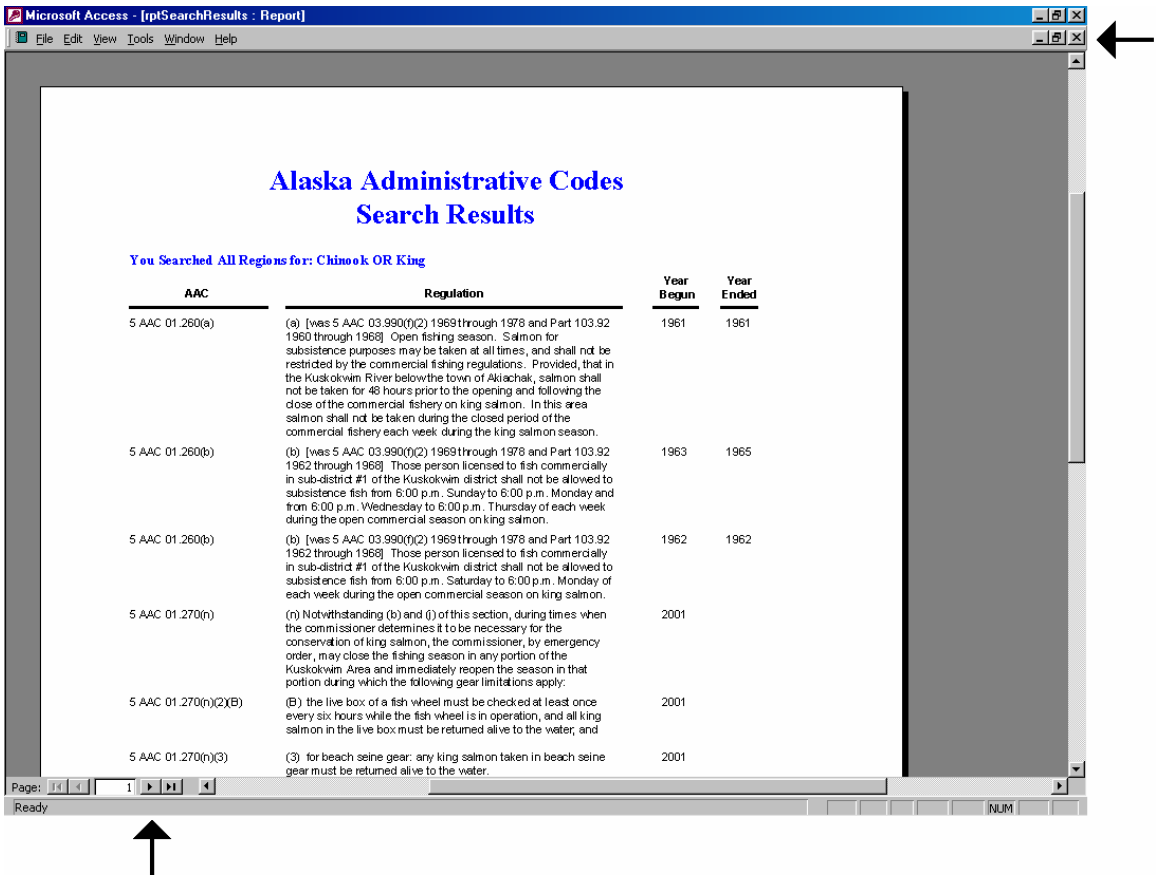


Fig. 5. Example of Opening Search Screen for Contents of "Alaska Subsistence Salmon Fishing Regulations Database."

Overview of Salmon Fisheries Management and Fishing Patterns

The overview of the subsistence salmon fishing patterns and salmon management was prepared after the completion of the database to ensure the primary objective was met. The primary author reviewed all subsistence studies described in the Technical Paper Series of the Alaska Department of Fish and Game, Division of Subsistence. Those reports with information relevant to salmon fishing patterns in the Kuskokwim and Yukon drainages are shown below (Tables 2 and 3). Two case examples from each area were drawn from these reports to provide a specific, yet representative, description of salmon fishing patterns along the lower the middle sections of each river. A section was added that provides an historical overview of Alaska salmon fisheries management during the 20th century.

Alaska Salmon Fisheries Management—an Historical Overview

The regulation of salmon fishing in Alaska has a nearly 100-year history; however its regulation in the Kuskokwim and Yukon River drainages dates from 1919. The Alaska Fisheries Service of the U.S. Department of Commerce, Bureau of Fisheries, was established in 1911 to monitor salmon fisheries in Alaska (Everman 1912). Alaskan salmon fisheries were regulated by the federal government through the Department of Commerce until 1940 when management and regulation were transferred to the U.S. Department of Interior, Fish and Wildlife Service. Later, in 1957, management and regulation were turned over to the Territory of Alaska and, in 1959, to the newly formed state of Alaska. For nearly one-half of the management history of the Kuskokwim and Yukon drainages salmon fisheries, the state of Alaska managed and regulated salmon fishing. In 1999, the federal government again assumed responsibility on federal public lands to ensure the rural subsistence priority under the Alaska National Interest Lands and Conservation Act (ANILCA).

In the years prior to contact with Alaska Native peoples, the indigenous inhabitants of Alaska managed fisheries according to customary laws, practices, and beliefs. Russian exploration and colonialism beginning in 1741 did not result in fisheries management until sometime after the Russian government chartered the Russian American Company in 1799 to commercialize resources in Alaska (Pennoyer 1988). Following the purchase of Alaska by the United States in 1867, the U.S. Fisheries Commission conducted studies of Alaska's fisheries resources, and it was only after the first cannery began operation in southeast Alaska in 1878 that fisheries began to be managed by the United States following the passage in 1889 of the Alaska Salmon Fisheries Act. These and other management efforts were broad in geographic scope, intended to stem the sharp increase in commercial harvest of salmon; and were considered largely ineffective in conserving salmon stocks (Pennoyer 1988).

In 1924 the federal White Act was adopted to conserve salmon, restrict commercial fisheries, and to specify escapement levels for many streams. This act also prohibited all commercial salmon fishing for export in the Yukon area (Public Law 204, Chapter 272) until 1934 when the Alaska Fisheries Act was amended again to permit commercial fishing for chinook/king salmon for export from the Yukon and Kuskokwim rivers by "native Indians and bona fide permanent white inhabitants along the said rivers" (Bower 1935; Public Law 106, Chapter 146 [1934]).

During the next 30 years, regulatory measures did little to reverse the decline of the salmon resource that continued into the 1950s (Pennoyer 1988). Following Alaska statehood in 1959, a new management system was instituted under Alaska statutes and fishing regulations. This system involved citizens in making regulations; and allowed fisheries managers flexibility to implement emergency regulations during the season, region by region, and area by area. The new system benefited from the biological data collected by the U.S. Fish and Wildlife Service in the late 1950s and was supplemented by an advisory committee system to obtain input from local residents when making regulations (Pennoyer 1988). Under the Alaska National Interest Lands Conservation Act (ANILCA) (94 Stat. 2371), local involvement in subsistence management is mandated through a system of federal regional advisory councils.

Subsistence fishing for salmon was protected from early in the 20th century by restrictions on commercial fisheries that have extended to the present day. The large and important subsistence salmon harvests in both the Kuskokwim and Yukon areas were noted in government reports of the federal Bureau of Fisheries as far back as 1919 (Bower 1919; Gilbert and O'Malley 1921).

As early as 1913, commercial fishing for export took place in Kuskokwim Bay while the Kuskokwim River was closed until 1935 (Pennoyer et al. 1965). In 1919, limits were placed on commercial fishing areas and commercial harvests of salmon in the lower Yukon River. None was allowed upriver of Clear River along the lower Yukon (mile 114). In 1924, commercial fishing in Yukon Area was prohibited, and in 1925, and the Kuskokwim area. Beginning in 1930, some commercial salmon fishing was allowed in Kuskokwim Bay and extended in 1935 with quotas and gear restrictions, although no commercial fishing for export took place in 1933 and 1934 (Pennoyer et al. 1965).

In the Yukon area, commercial operations for export were prohibited until 1932, when two salteries operated. Later, in 1934, "hand-pack" cannery operated, with a second one opening in 1940. In 1953, a Catholic mission opened a "hand-pack" cannery, and one of the other operations converted to "one-line" cannery along the lower Yukon River (Pennoyer et al. 1965). By 1961, there were six salteries, two "hand-pack" canneries, three "one-line" canneries, and two freezer operations processing salmon taken for export in the Yukon drainage (Pennoyer et al. 1965).

During this period, 1932-1961, commercial chinook/king salmon harvests ranged between about 4,700 (1932) and 120,000 (1961). From 1922 through 1960, commercial chum salmon fishing was essentially non-existent, although harvests ranged between about 74,000 and 328,000 from 1918 through 1921 (Pennoyer et al. 1965). During the 1932-1961 period, subsistence chinook/king salmon harvests ranged between about 12,000 (1958) and 24,000 (1961), with the exception of the extremely low run year of 1937 when about 5,500 were taken. Chum salmon

harvests ranged between about 197,000 (1942) and 1 million (1932) during the same period (Pennoyer et al. 1965). The magnitude and importance of the subsistence salmon fishery in the Yukon area has continued to the present day as described in the studies cited in Table 3 and noted in the case examples provided below.

Except for a two-year closure on commercial fishing in the Kuskokwim area in 1952 and 1953, some commercial fishing has been allowed, and subsistence fishing continued as the primary use of salmon. Even though commercial fishing was allowed after 1953, none occurred until 1959. The commercial fishery was very small owing to the lack of infrastructure to support the commercial salmon industry, limits on harvests, and extreme distance from usual markets (Wolfe et al. 1984). Commercial harvests were low, less than 10,000 chinook/king salmon in any year prior to 1960, except 1920 and 1924 (Pennoyer et al. 1965).

In contrast to the commercial fishery through 1961, Kuskokwim subsistence harvests ranged from over 10,000 to 33,500 king salmon and 130,000 to 597,000 based on actual counts between 1934 and 1961 (Pennoyer et al. 1965). The magnitude and importance of the subsistence salmon fishery in the Kuskokwim area has continued to the present day as described in the studies cited in Table 2 and noted in the case examples provided below.

The challenge to fisheries managers and the Alaska Board of Fisheries since statehood has been to protect the important subsistence salmon fishery while providing for commercial fisheries in the Kuskokwim and Yukon areas consistent with sustained yield. Numerous studies have described the subsistence-based mixed economy of these areas, where communities are largely dependent on wild resources for food (Wolfe 1981, 1984, 1998; Andrews 1988, 1989; Wolfe and Walker 1987).

Since 1918, when Yukon residents appealed to the United States government over their concern about salmon returns, residents have stressed the importance of salmon as a local food source, and salmon fishing as an integral part of the culture and life ways of the indigenous people and rural residents. In 1978, the Alaska legislature adopted a law placing a priority on the subsistence uses of Alaska's fish and wildlife, commonly referred to as the "subsistence law" (Ch. 151, SLA 1978). A subsistence priority was included as well in the 1980 federal law, ANILCA, and applied to rural residents using federal public lands for subsistence harvests of fish and wildlife.

In the latter 20th century, the commercial importance of fisheries to many rural communities of the Yukon and Kuskokwim areas cannot be overlooked. In these areas, the cash sector is also essential to rural economies where income is invested in equipment and fuel necessary to harvest wild foods (Wolfe 1998). One of management's greatest challenges of Yukon and Kuskokwim salmon fisheries, has been the protection of subsistence fishing as a priority use, and management to provide a meaningful level of commercial fishing without jeopardizing the sustainability of the salmon runs.

In 1973, the Alaska legislature established a limit on the number of participants and gear in the fisheries, as part of the statewide "limited entry program," in order to manage the resource and provide an adequate livelihood from fishing. Following the 1977 application deadline, a limited

number of fish wheel and gill net commercial fishing permits were issued for the Yukon and Kuskokwim rivers. Subsequently, markets developed; total harvests increased; and restrictions on fishing time, gear, and locations were placed on the commercial fishery. Many of these restrictions affected the subsistence fishery. In some areas there were concerns about illegal commercial fishing and the sale of salmon taken in the subsistence fishery entering into the commercial market, so subsistence fishing time was reduced or restricted. In other areas, concurrent subsistence and commercial fishing times meant that subsistence fishing time was reduced every time commercial fishing was cut back to prevent over-harvest.

In general, total salmon production, commercial and subsistence, increased from the late 1970s through the mid-1990s, although there were severe reductions in some species, in some years, such as fall chum salmon in the Yukon drainage. In the late 1990s, the run and escapement levels several species and stocks were below management objectives, and severe restrictions were placed on commercial, and even subsistence, fisheries. In 2000 and 2001 commercial fishing for salmon was prohibited for the season in Yukon fishing districts and in 2001 in most Kuskokwim fishing districts. Restriction on subsistence salmon fishing in both drainages were also necessary to protect the salmon resource (Vania and Hayes 2001; ADF&G 2001b). By 2001, anticipated salmon returns were so poor, that even continued subsistence fishing has been threatened, and commercial fishing is at its lowest since the limited entry program began in 1977.

Kuskokwim Subsistence Salmon Fishing Patterns—An Overview

In Alaska, salmon is one of the major wild resources harvested in the Kuskokwim drainage for subsistence uses. For most communities within the Kuskokwim River drainage, salmon is the major fish species taken for food. The Kuskokwim drainage subsistence salmon fishery is one of the largest in the state, both in magnitude and on a per capita basis. In 1999, the combined Kuskokwim and Yukon salmon fisheries accounted for 45 percent of all salmon taken in the state for subsistence purposes. Chinook salmon taken for subsistence in the Kuskokwim drainage accounted for 50 percent of the state's total, whereas chum and sockeye salmon each accounted for 14 percent of the state's total (ADF&G 2001a). The Kuskokwim fisheries management area, or Kuskokwim Area, includes all waters of Alaska within the Kuskokwim River drainage and coastal waters within three miles of the Bering Sea coast between Cape Newenham and Naskonat Peninsula (Fig. 2).

The following section provides an overview of the patterns of salmon fishing in the Kuskokwim Area in terms of customary fishing times, or seasonality, and gear as derived from recent studies (Table 2). Two case examples are used to supplement this description. Harvest trends are covered thoroughly in a recent work that is updated annually and are not included here (ADF&G 2001a). However, the overall magnitude of harvests is noted below.

Families from 37 communities in the Kuskokwim Area fish for salmon for subsistence uses. Collectively, these communities had a total population of about 16,600 (ADL&WD 2001). Residents of these communities are predominately Alaska Native—most are of Yup'ik Eskimo

TABLE 2. Studies Relevant to Kuskokwim Drainage Fisheries Management Area Subsistence Salmon Fishing Patterns and Regulations.

Kuskokwim Area Fishing District	Communities	Study Year(s)	Document	Title, Author(s), Publication Year
All Kuskokwim Districts	All	1960-1999	(CD-ROM database)	Alaska Subsistence Fisheries, 1999 Annual Report. Division of Subsistence, ADF&G, 2001.
All Kuskokwim Districts	All	1989-1999	(CD-ROM database)	Alaska Subsistence Fisheries Database. Version 3.00. Louis A. Brown, David A. Caylor, Gretchen B. Jennings, and Charles J. Utermohle. 4/1/01.
All Kuskokwim Districts	Various	1981-2000	(CD-ROM database)	Community Profile Database. Version 3.11. Louis A. Brown, Gretchen B. Jennings, Cheryl L. Scott, and Charles J. Utermohle, 3/27/01.
All Kuskokwim Districts	All	1960-1985	T.P. No 146	Kuskokwim River Subsistence Chinook Fisheries: An Overview. Elizabeth Andrews and Michael Coffing, 1986.
All Kuskokwim Districts	All	1989	T.P. No. 189	Subsistence Salmon Harvest in the Kuskokwim Area during 1989. Robert J. Walker and Michael W. Coffing, 1993.
W-1	Kwigillingok	1981-1983	T.P. No. 85	Coastal Ecology and Wild Resource Use in the Central Bering Sea Area: Hooper Bay and Kwigillingok. Alice A. Stickney, 1984.
W-1	Nunapitchuk	1983	T.P. No. 177*	The Akulmiut: Territorial Dimensions of a Yup'ik Eskimo Society. Elizabeth Andrews, 1989.
W-1	Bethel	1979-1986	T.P. No. 154	The Role of Fish and Wildlife in the Economies of Barrow, Bethel, Dillingham, Kotzebue, and Nome. Robert J. Wolfe, James A. Fall, Virginia Fay, Susan Georgette, James S. Magdanz, Sverre Pedersen, Mary C. Pete, and Janet Schichnes (contributors), 1986.

* Indicates study with some discussion of salmon fishing regulations.

TABLE 2. continued.

Kuskokwim Area Fishing District	Communities	Study Year(s)	Report No.	Report Title, Author(s), Publication Year
W-1	Kwethluk	1986-1987	T.P. No. 157*	Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use, and the Subsistence Economy of a Lower Kuskokwim Area Community. Michael W. Coffing, 1992.
W-2	Tuluksak	1980-1983	T.P. No. 87	Wild Resource Use of the Tuluksak River Drainage by Residents of Tuluksak, 1980-1983. Elizabeth Andrews and Raymond Peterson, 1983.
W-2	Aniak, Chuathbaluk, Crooked Creek, Georgetown, Kalskag, Red Devil, Sleetmute, Stony River	1981	T.P. No. 53	Middle Kuskokwim Food Survey II. Alice A. Stickney, 1981.
W-2	Aniak, Crooked Creek, Red Devil	1982-1986	T.P. No. 141	An Overview of Resource Use Patterns in the Central Kuskokwim: Aniak, Crooked Creek, Red Devil. Taylor Brelsford, Raymond Peterson, and Terry L. Haynes, 1986.
W-2	Chuathbaluk, Sleetmute	1983	T.P. No 81	Human Ecology of Two Central Kuskokwim Communities: Chuathbaluk and Sleetmute. Susan Charnley, 1984.
Upper Kuskokwim	Stony River	1983-1984	T.P. No. 108	Wild Resource Use and Economy of Stony River Village. Priscilla Russell Kari, 1985.
Upper Kuskokwim	Lime Village	1982-1983	T.P. No. 80	Land Use and Economy of Lime Village. Priscilla Russell Kari, 1983.
Upper Kuskokwim	Nikolai, Telida	1980	T.P. No. 20	Subsistence Resource Utilization: Nikolai and Telida—Interim Report. Alice A. Stickney, 1980.
Upper Kuskokwim	Nikolai, Telida	1980	T.P. No. 21	Subsistence Resource Utilization: Nikolai and Telida—Interim Report II. Alice A. Stickney, 1981.

* Indicates study with some discussion of salmon fishing regulations.

TABLE 2. continued.

Kuskokwim Area Fishing District	Communities	Study Year(s)	Report No.	Report Title, Author(s), Publication Year
Upper Kuskokwim	Nikolai, Telida	1981, 1982	T.P. No. 23*	Subsistence Salmon Fishing in the Upper Kuskokwim River System, 1981 and 1982. Jeff Stokes, 1982.
Upper Kuskokwim	Nikolai, Telida, McGrath, Takotna	1981-1984	T.P. No. 86*	Natural Resource Utilization of Four Upper Kuskokwim Communities. Jeff W. Stokes, 1985.
W-4, W-5	Quinhagak, Goodnews Bay	1983	T.P. No. 89*	Subsistence-Based Economies in Coastal Communities of Southwest Alaska. Robert J. Wolfe, Joseph J. Gross, Steven J. Langdon, John M. Wright, George K. Sherrod, Linda J. Ellanna, Valerie Sumida, and Peter J. Usher, 1984.
W-5	Goodnews Bay	1983	T.P. No 100	The Role of Kinship Linkages in Subsistence Production: Some Implications for Community Organization. Linda J. Ellanna and George K. Sherrod.

* Indicates study with some discussion of salmon fishing regulations.

or Athabaskan Indian descent. In 1999, there were about 1,700 salmon fishing households in the Kuskokwim Area with about 1,500 within the Kuskokwim River drainage (ADF&G 2001a). Chinook salmon comprised the largest percentage of the total salmon harvest, with 38 percent of the total in 1999.

Since 1990, subsistence salmon harvests have ranged between 68, 665 and 100,159 chinook or king salmon; 28,622 and 56,404 sockeye salmon; 47,612 and 131,469 chum salmon; and 27,239 and 55,581 coho salmon. Pink salmon also occur in the lower and middle Kuskokwim River, after the peak of the chinook run, however, they are not abundant, and are not sought-after. Average harvests for the 1990 to 1999 period were 87,270 chinook; 41,276 sockeye, 78,146 chum, and 38,216 coho salmon (ADF&G 2001a).

Along the lower Kuskokwim River and Kuskokwim Bay, salmon fishing begins in May with the arrival of chinook salmon migrating from the north Pacific Ocean and Bering Sea to spawning streams in the Kuskokwim drainage. Salmon fishing generally concludes in late September with the final migration of coho salmon in the Kuskokwim drainage. For nearly five months of the year, communities prepare for or engage in salmon fishing and processing the harvest for food.

Communities along the Kuskokwim River and its tributaries harvest chinook salmon as they ascend the river to spawn: some reach as far as 700 miles distant from the mouth of the river in late July. The chinook run of salmon is followed by sockeye and chum salmon runs that extend into September in some areas of the drainage. The importance of each species for food varies throughout the drainage. For example, the small community of Lime Village, over 300 miles distant from the mouth of the river, relies on the July arrival of sockeye salmon as a major food source (Kari 1983).

In other communities along the upper Kuskokwim River, such as McGrath and Nikolai, chum salmon are the most abundant salmon species available, and are sought after for food from late July to September. The late arriving coho salmon typically enter the Kuskokwim River in early August and are taken throughout September by lower river communities; and as late as October as they ascend the Kuskokwim River to spawning streams in the upper reaches of the drainage (Stokes 1985).

Salmon fishing activities are based either from a remote fishing camp or the home community. However, the degree to which one or the other is more prevalent varies from community to community and from year to year for some individual families. Not all fishing camps are located along the main stem of the Kuskokwim, but also along tributary streams, such as the Kwethluk, Tuluksak, Aniak, Holitna, Stony, and Salmon rivers.

Drift gill nets, set gill nets, fish wheels, and rod and reel are used for taking salmon in the Kuskokwim Area for subsistence. In the lower Kuskokwim River and Kuskokwim Bay, fishing with drift gill nets is the predominant method for salmon fishing; however, set nets are used by some families.

Further upriver, from Tuluksak to Chuathbaluk, three types of gear are used—drift gill net, set gill net, and fish wheel—owing to the feasibility of using each type of gear under particular river

conditions. In the furthest upriver areas, fish wheels and set gill nets are the primary gear, as the use of drift gill nets is not effective. In one area of the upper Kuskokwim drainage, rod and reel are used also for taking chinook salmon, since other gear is not effective. Throughout the drainage, families sometimes use rod and reel for taking salmon, particularly king salmon, when large quantities are not sought, and fresh food is desired.

Two case examples provide a picture of subsistence salmon fishing along the lower and middle Kuskokwim River during the mid-1980s, when there were several comprehensive studies of salmon fishing patterns. In more recent years, studies have focused on harvest levels and trends.

In the community of **Kwethluk**, one example, nearly 50 percent of households moved to 52 salmon fishing camps located within eight miles of the community and situated along the Kuskokwim River, Kwethluk River, and Kuskokuak Slough (Andrews and Coffing 1986; Coffing 1991). Three were located within the community proper. In 1986, the community of Kwethluk had a population of 540 in 112 households (Coffing 1991), roughly 25 percent smaller than the 1999 population of 713 (ADL&WD 2001). Fishing camps typically consisted of fish drying racks and smokehouses, and small cabins and tent sites. Over one-half (58 percent) of the fishing camps were used by multiple households who cooperated in the harvest and processing of salmon (Andrews and Coffing 1986).

For Kwethluk residents, an intense period of fishing took place during a one-month period from mid-June to mid-July to harvest chinook salmon which were primarily dried and smoked for use during the coming year. Virtually all of the salmon caught were completely utilized—heads, eggs, and backbones were often preserved for human consumption or were fed to dogs.

In 1986, the total salmon harvest of four species accounted for 55 percent of all wild food harvested by community residents in 1986 (Coffing 1991). In Kwethluk, 446 of 815 lbs. per capita were salmon, roughly equating to 1 ¼ lbs. per person per day. Chinook salmon, specifically, accounted for 43 percent of all salmon harvested (in pounds) and 24 percent of the total wild food harvested in 1986 (Coffing 1991). In 1999, chinook made up 61 percent of the total salmon harvested in pounds or 145 lbs. per capita; with sockeye accounting for 31 lbs. per capita, and coho 27 lbs. per capita. Salmon harvests (including chum salmon) provided 236 lbs. per capita (ADF&G 2001).

Salmon were caught in set gill nets ranging in length from 10 to 270 feet, with the length dependent upon the specific characteristics of the river channel, sandbar, or river bank where it was placed. Drift gill nets, usually 300 feet long, were used in the main stem of the Kuskokwim. Most fishing families used both types of gear for chinook salmon fishing. Other salmon species were taken using the same type of gear, although with a reduced mesh size.

Sockeye and chum salmon fishing generally were completed by late July; and coho salmon fishing by late August. Between late August and early October, coho salmon were harvested by some households for use in feeding dog teams. Owing to the poor drying conditions typical during this period, fish were buried whole in pits dug into the ground for use as dog food at a later time (Coffing 1991).

In the middle Kuskokwim River community **Chuathbaluk**, residents fished for salmon using fish wheels as well as drift and set gill nets. Half of all households fished for salmon with one-third relocating to summer fishing camps. In general, families using fish wheels maintained fishing camps some distance from the community, whereas, others primarily fished from a base of operations in the community (Charnley 1984). Some families used drift and set gill nets, generally 150 to 200 feet long; with mesh size varying depending upon the salmon species targeted (Charnley 1984).

In 1982, the community of Chuathbaluk had a population of 132 in 29 households, similar in size to the 1999 population of 119 (ADL&WD 2001). Fishing camps were located up to 30 miles from the community, and actual fishing sites spanned approximately 55 river miles (Charnley 1984). Two households occupied single-family settlements year-round located across from or within several miles from the village site and fished from these home settlements. Similar to fishing camps used by Kwethluk residents, the camps included fish drying racks and smokehouses, small cabins and tent sites, and food caches.

Chuathbaluk salmon harvests in 1982, although lower in total number owing to the smaller community size, were nearly identical to those of Kwethluk in terms of per capita harvest of chinook and coho salmon—roughly 193 and 44 pounds respectively—nearly two-thirds pound per day, per person (Coffing 1991; Charnley 1984). Sockeye harvests were greater, 194 lbs. per capita, but the total pounds of salmon likely taken for human consumption was about the same between the two communities, about 425 pounds per person (when the chum harvest for dog food is omitted). In 1999, the Chuathbaluk harvest of chinook and sockeye salmon was similar to that of Kwethluk on a per capita basis—158 lbs. per capita chinook and 28 lbs. per capita sockeye. With the addition of 7 lbs. per capita chum, total salmon harvest (excluding chum) was 193 lbs. per capita for Chuathbaluk residents in 1999. Chinook salmon made up most of the harvest, nearly 92 percent.

Salmon fishing by Chuathbaluk households took place between June and September, although most completed fishing by mid-August with the onset of rainy weather that makes drying difficult, and people's subsistence harvesting shifts to berry picking and moose hunting (Charnley 1984). The school year also began in mid to late August requiring many households to return from fish camps, so children could attend school. Salmon were primarily dried and smoked for use during the coming year, and were also jarred, salted, and pickled. Between late August and early October, coho salmon were harvested by some households for use in feeding dog teams.

Subsistence salmon fishing regulations restrict harvest activities in terms of eligibility, gear, and fishing times. Quantity is not limited and individual permits and licenses have not been required. In general, subsistence salmon fishing is least restricted prior to and after the commercial salmon fishing season. However, once the commercial salmon fishing season begins, subsistence salmon fishing is further restricted in terms of fishing times (ADF&G 2001). Actual fishing times vary among the fishing districts, and fluctuate based on salmon abundance, projected salmon returns, commercial fishing quotas, and the like. In areas where there are no commercial fisheries, such as the upper Kuskokwim River, subsistence salmon fishing is allowed seven days per week.

In 1999, there were no subsistence salmon fishing closures other than those typically associated with commercial fishing, nor any emergency restrictions to reduce subsistence harvests. Specific regulations for each fishing district in the Kuskokwim Area for the years 1960 through 2001are contained in the database associated with this report. In 2001, due to anticipated poor chinook and chum salmon returns, June and July commercial fisheries were closed in the lower Kuskokwim and portions of the middle Kuskokwim River. Subsistence salmon was limited to four days per week throughout the drainage during most of June and July (ADF&G 2001b).

Yukon Subsistence Salmon Fishing Patterns—An Overview

In Alaska, salmon is one of the major wild resources harvested in the Yukon drainage for subsistence uses, and the primary fish resource taken for food. For most communities along the Yukon River, salmon is the major food fish. The Yukon drainage subsistence salmon fishery is one of the largest in the state, both in magnitude and on a per capita basis. In 1999, the combined Yukon and Kuskokwim salmon fisheries accounted for 45 percent of all salmon taken in the state for subsistence purposes. Chinook salmon taken for subsistence in the Yukon drainage made up 33 percent of the state's total, whereas chum salmon account for 48 percent of the state's total (ADF&G 2001a). The Yukon fisheries management area, or Yukon Area, includes all waters of Alaska within the Yukon River drainage and coastal waters within three miles of the Bering Sea coast between Naskonat Peninsula and Point Romanof (Fig. 3).

The following section provides an overview of the patterns of salmon fishing in the Yukon Area in terms of customary fishing times, or seasonality, and gear as derived from recent studies (Table 3). Two case examples are used to supplement this description. Salmon harvest trends are covered thoroughly in a recent work that is updated annually and are not included here (ADF&G 2001a). However, the overall magnitude of harvests is noted below.

Families from 39 communities in the Yukon Area fish for salmon for subsistence uses (excluding communities in the greater Fairbanks area and others where salmon are not present). Collectively, these rural communities had a total population of about 11,000 in 1999 (ADL&WD 2001). Residents of these communities are predominately Alaska Native—most are of Yup'ik Eskimo or Athabaskan Indian descent. In 1999, there were about 1,400 salmon fishing households in the Yukon Area (ADF&G 2001a). Chum salmon, the summer and fall runs combined, accounted for the largest percentage of the total Yukon Area salmon harvest—nearly 70 percent of the total in 1999.

Since 1990, subsistence salmon harvests have ranged between 45,671 and 63,915 chinook/king salmon; 79,250 and 142,192 summer chum salmon; 62,901 and 167,900 fall chum; and 15,812 and 51,980 coho salmon. Pink and sockeye salmon are present in the lower Yukon River area, but are low in abundance, are not targeted for harvest, and are used when caught. Average salmon harvests for the 1990 to 1999 period were 51,830 chinook; 116,698 summer chum; 112,326 fall chum; and 31,125 coho salmon (ADF&G 2001a).

TABLE 3. Studies Relevant to Yukon Drainage Fisheries Management Area Subsistence Salmon Fishing Patterns and Regulations.

Yukon Area Fishing District/Subdistrict	Communities	Study Year(s)	Document	Title, Author(s), Publication Year
All Yukon Districts	All	1975-1999	(CD-ROM database)	Alaska Subsistence Fisheries, 1999 Annual Report. Division of Subsistence, ADF&G, 2001.
All Yukon Districts	All	1992-1999	(CD-ROM database)	Alaska Subsistence Fisheries Database. Version 3.00. Louis A. Brown, David A. Caylor, Gretchen B. Jennings, and Charles J. Utermohle. 4/1/01.
All Yukon Districts	Various	1980-2000	(CD-ROM database)	Community Profile Database. Version 3.11. Louis A. Brown, Gretchen B. Jennings, Cheryl L. Scott, and Charles J. Utermohle, 3/27/01.
All Yukon Districts	All	1977-1988	T.P. No. 187	Subsistence Harvest of Pacific Salmon in the Yukon River Drainage, Alaska, 1977-88. Robert J. Walker, Elizabeth F. Andrews, David B. Andersen, and Neil Shishido, 1989.
All Yukon Districts	All	1977-1985	T.P. No. 147	Yukon River Subsistence Fall Chum Fisheries: An Overview. Elizabeth Andrews, 1986.
All Yukon Districts	All	1986	WUNS No.1	The Salmon Fishing People of the Yukon River. Division of Subsistence, ADF&G, 1987.
All Yukon Districts	Various	1986	WUNS No. 2	Salmon Fishing Methods of the Yukon River. Division of Subsistence, ADF&G, 1987.
All Yukon Districts	Various	1986	WUNS No. 3	Family Fishcamps of the Yukon River. Division of Subsistence, ADF&G, 1987.
Various Yukon Districts	Fort Yukon, Huslia, Kaltag, Manley, Russian Mission, St. Marys, Tanana	1991	T.P. No. 210	The Use of Dog Teams and the Use of Subsistence-Caught Fish for Feeding Sled Dogs in the Yukon River Drainage, Alaska. David B. Andersen, 1992.

TABLE 3. continued.

Yukon Area Fishing District/Subdistrict	Communities	Study Year(s)	Document	Title, Author(s), Publication Year
Y-1	Alakanuk, Emmonak, Kotlik	1980	T.P. No 59	Norton Sound/Yukon Delta Sociocultural Systems Baseline Analysis. Robert J. Wolfe, 1981.
Y-1	Alakanuk, Emmonak, Kotlik, Sheldon Point	1980-1982	T.P. No. 60*	The Subsistence Salmon Fishery of the Lower Yukon River. Robert J. Wolfe, 1982.
Y-2	Mt. Village	1980	T.P. No. 59	Norton Sound/Yukon Delta Sociocultural Systems Baseline Analysis. Robert J. Wolfe, 1981.
Y-2	Mt. Village, Pilot Station, Pitka's Point, St Marys	1980-1982	T.P. No. 60*	The Subsistence Salmon Fishery of the Lower Yukon River. Robert J. Wolfe, 1982.
Y-3	Russian Mission	1985	T.P. No. 127*	Contemporary Patterns of Wild Resource Use by Residents of Russian Mission, Alaska. Mary C. Pete, 1991.
Y-4A	Galena, Kaltag, Koyukuk, Nulato, Ruby	1980	T.P. No. 17	Issue Paper on Subsistence King Salmon Drift Gillnetting, Yukon Area Subdistrict Y-4A. Carole C. Huntington, 1981.
Y-4A	Kaltag, Nulato	1982	T.P. No. 18	The King Salmon Drift Net Fishery of the Middle Yukon: An Overview and Study of the 1982 Season. James R. Marcotte, 1982.
Y-4A	Kaltag	1985	T.P. No. 156*	Salmon Fishing Patterns Along the Middle Yukon River at Kaltag, Alaska. Priscilla Wheeler, 1987.
Y-4B, 4C	Galena	1985-86	T.P. No. 155*	Subsistence Harvest of Fish and Wildlife by Residents of Galena, Alaska, 1985-86. James R. Marcotte, 1990.
Y-4 (Koyukuk River)	Huslia	1983	T.P. No. 133	Contemporary Resource Use Patterns in Huslia, Alaska, 1983. James R. Marcotte, 1986.
Y-4 (Koyukuk River)	Alatna/Allakaket, Bettles, Hughes	1983	T.P. No. 93	Contemporary Resource Use Patterns in the Upper Koyukuk Region, Alaska. James R. Marcotte and Terry L. Haynes, 1984.

* Indicates study with some discussion of salmon fishing regulations.

TABLE 3. continued.

Yukon Area Fishing District/Subdistrict	Communities	Study Year(s)	Document	Title, Author(s), Publication Year
Y-5A, 5B, 5C	Tanana	1987	T.P. No. 178	Contemporary Wild Resource Use Patterns in Tanana, Alaska, 1987. Martha Case and Libby Halpin, 1990.
Y-5D	Stevens Village	1984	T.P. No. 129	Land and Resource Use Patterns in the Yukon Flats: Stevens Village. Valerie Sumida, 1986.
Y-5D	Beaver	1985	T.P. No. 140	Patterns of Land and Resource Use in Beaver, Alaska. Valerie A. Sumida and Clarence L. Alexander, 1986.
Y-5D	Fort Yukon	1987	T.P. No. 179	Patterns of Fish and Wildlife Use for Subsistence in Fort Yukon, Alaska. Valeria A. Sumida and David B. Andersen, 1990.
Y-6B	Minto	1983-84	T.P. No. 137*	The Harvest of Fish and Wildlife for Subsistence by Residents of Minto, Alaska. Elizabeth Andrews, 1988.
Y-6B	Nenana	1981-1982	T.P. No. 91	Modern Foragers: Wild Resource Use in Nenana Village, Alaska. Anne Shinkwin and Martha Case, 1984.
Y-6C	Fairbanks	1980	T.P. No. 15	Interim Report on the Survey of Permit Holders in the Tanana Subsistence Permit Fishery (Sub-Unit Y6-C), 1980. Richard A. Caulfield, 1980.
Y-6C	Fairbanks	1981	T.P. No. 14*	Final Report on the Survey of Permit Holders in the Tanana River Subsistence Salmon Permit Fishery, 1981. Richard A. Caulfield, 1981.

* Indicates study with some discussion of salmon fishing regulations.

Along the lower Yukon River, salmon fishing begins in mid-May with the arrival of chinook salmon migrating from the north Pacific Ocean and Bering Sea to spawning streams in the Yukon drainage. Salmon fishing generally concludes in late September and early October along the upper reaches of the Yukon drainage, as the ice freezes over, with the final migration of fall chum and coho salmon. For nearly four months of the year, communities are preparing for or engaging in salmon fishing and processing the harvest for food.

Communities along the Yukon River and its tributaries harvest chinook salmon as they ascend the river to spawn; some reaching as far as 1,200 miles distant from the mouth of the river in late July as they ascend further upstream into Canada. The chinook run of salmon is followed by a summer and fall run of chum salmon.

In other communities along the upper Yukon River, such as Fort Yukon, as well as Hughes along the upper Koyukuk River, chum salmon are the most abundant salmon species available, and are sought after for food for human consumption and dog teams from late July to September. The late arriving coho salmon typically enter the Yukon River in early August and are taken through early September by lower river communities; and as late as mid-October as they ascend the Yukon River to spawning streams in the upper reaches of the drainage prior to freeze-up.

Last, coho salmon runs extend into early October in some areas of the drainage to spawn and are an important food source for some communities. For example, the small community of Chalkyitsik, over 1,000 miles distant from the mouth of the river, relies on the October arrival of coho salmon as a major food source (Nelson 1973).

Salmon fishing activities are based either from a remote fishing camp or the home community. However, the degree to which one or the other is more prevalent varies from community to community and from year to year for individual families. Not all fishing camps are located along the main stem of the Yukon, but are also along tributary streams, such as the Koyukuk, Tanana, and Porcupine rivers.

Drift gill nets, set gill nets, fish wheels, and rod and reel are used for taking salmon in the Yukon Area for subsistence. In the lower Yukon River area, fishing with drift gill nets is the predominant method for salmon fishing; however, set nets are used also, and are most commonly used for fishing in coastal areas.

Along the middle Yukon River from about Holy Cross to Galena, three types of gear are used—drift gill net, set gill net, and fish wheel—owing to the feasibility of using each type of gear under particular river conditions. Further upriver, from Ruby to the US/Canada border, and along the Koyukuk, Tanana, and Porcupine rivers, fish wheels and set gill nets are the primary gear, as the use of drift gill nets is not effective in most areas. In some areas of the drainage, families sometimes use rod and reel for taking salmon, particularly chinook salmon, when large quantities are not sought, and fresh food is desired.

Two case examples provide a picture of subsistence salmon fishing along the lower and middle Yukon during the mid-1980s, when there were several comprehensive studies of salmon fishing patterns. In more recent years, studies have focused on harvest levels and trends.

In the community of **Tanana**, situated along the middle Yukon River opposite the mouth of the Tanana River, nearly 70 percent of all households fished for salmon in 1987. In 1987, the community of Tanana had a population of 373 in 128 households, somewhat larger than the 1999 population of 308 (Case and Halpin 1990; ADL&WD 2001). Many moved to one of the 29 salmon fishing camps located along the Yukon and Tanana rivers. Most were within 40 miles of the community, spanning a distance of 125 miles, and one camp was as far as 75 river miles from the home community (Case and Halpin 1990). Some families fished from the community, also. Often multiple households and extended family groups shared the use of fishing camps and cooperated in the harvest and processing of salmon (Case and Halpin 1990). Fishing camps typically consisted of fish drying racks and smokehouses; small cabins and tent sites; and fish cutting tables and caches.

In Tanana, an intense period of fishing took place during a one-month period from late-June to late-July to harvest chinook salmon which were primarily dried and smoked for use during the coming year. Virtually all of the salmon caught were completely utilized, including fish heads and backbones that were often preserved for human consumption or were fed to dogs.

The importance of salmon as a food source is noteworthy. In 1987, the total salmon harvest of chinook, chum, and coho accounted for 71 percent of all wild food harvested by community residents for human consumption (Case and Halpin 1990). In Tanana, 60 percent, or 480 of 801 lbs. per capita, were chinook (234 lbs. per capita) and coho salmon taken for human food, roughly equating to 1 1/3 lbs. per person per day. In 1999, chinook provided 186 lbs. per capita based on 1999 harvest figures (ADF&G 2001a).

Salmon were caught in set gill nets and fish wheels with the use of one gear type or another dependent upon the quantity sought, range of species desired, availability of good eddy sites, and ability to check nets or wheels (Case and Halpin 1990). Some fishing families used both types of gear for chinook salmon fishing. Overall, roughly one-half of the chinook salmon caught in 1987 was taken in fish wheels and the other half in nets. In contrast, over 90 percent of chum and coho salmon were taken in fish wheels (Case and Halpin 1990).

Summer chum salmon fishing generally was completed by mid-August; and coho and fall chum salmon fishing by mid-October with the onset of ice freezing over the Yukon and Tanana rivers. Fish for human consumption were processed by drying and smoking, salting, pickling, canning, and jarring. In September, fall chum and coho salmon were harvested by some households for use in feeding dog teams. Fish taken for use as dog food were typically split and hung by the tail to freeze in the cool natural air and were similarly frozen by placing them in log cribs that also allowed the fish to ferment before freezing out of doors (Case and Halpin 1990).

In the lower Yukon River community of **Russian Mission**, most residents moved to summer fishing camps and fished for salmon using drift and set gill nets (Pete 1991). Nearly 80 percent of Russian Mission households fished for salmon with over one-half relocating to summer fishing camps. In 1984, the community of Russian Mission had a population of 236 in 49 households, somewhat smaller in size to the 1999 population of 296 (ADL&WD 2001). Most of

the 16 fishing camps were located within 5 miles of the community, although some were up to 35 miles from the community, and one was located nearly 120 miles distant (Pete 1991).

Similar to fishing camps elsewhere along the Yukon and Kuskokwim rivers, camps used by Russian Mission families included fish drying racks and smokehouses; small cabins and tent sites. Typically, there were also food caches and net-drying racks; and fish processing facilities, such as cutting tables and hand-made wooden cribs for holding fish before cutting (Pete 1991).

In 1984, Russian Mission salmon harvests were roughly 134 lbs. per capita of chinook salmon, and 97 lbs. per capita of chum and coho salmon combined. This provided nearly 2/3 lb. per day, per person, for food (Pete 1991). Salmon were primarily dried and smoked for use during the coming year, and were also frozen and salted. In 1999, harvests provided 150 lbs. per capita of chinook salmon and 23 lbs. per capita of other chum and coho salmon combined based on 1999 harvest figures (ADF&G 2001).

Drift and set gill nets used were used for both king and small salmon fishing, although nearly two-thirds of king salmon were taken in drift gill nets and 47 percent of small salmon taken in drift nets compared to gill nets. Drifts nets were between 120 and 300 feet long; whereas, set nets were shorter, between 60 and 90 feet in length; with mesh size varying depending upon the salmon species targeted (Pete 1991). Most fishing families used either drift or set gill nets with very few using both types of gear during the salmon fishing season.

Salmon fishing by Russian Mission households took place primarily during a 3-month period from early June to late August, when the onset of rainy weather makes drying difficult, and subsistence harvesting shifts to moose hunting (Pete 1991). As the school year also began in mid- to late-August, many households had to return from fish camps to the home community, so children could attend school.

Subsistence salmon fishing regulations restrict harvest activities in terms of eligibility, gear, and fishing times. Quantity is not limited and individual permits and licenses have not been required. In general, subsistence salmon fishing is least restricted prior to and after the commercial salmon fishing season. However, once the commercial salmon fishing season begins, subsistence salmon fishing is further restricted in terms of fishing times (ADF&G 2001). Actual fishing times vary among the fishing districts, and fluctuate based on salmon abundance, projected salmon returns, commercial fishing quotas, and the like. In areas where there are no commercial fisheries, subsistence salmon fishing is allowed either five or seven days per week.

In 1999, there were no subsistence salmon fishing closures, nor any emergency restrictions to reduce subsistence harvests. Specific regulations for each fishing district in the Yukon Area for the years 1960 through 2001are contained in the database associated with this report. In 2001, due to anticipated poor returns of chinook salmon, commercial chinook and chum fisheries were closed in most areas of the Yukon (Vania and Hayes 2001). Subsistence salmon fishing for chinook and chum was restricted throughout the drainage in June, July, and August.

Limitations

There were several limitations to the study and these were noted in the database for the information of the user. The baseline file for the 2001 regulations was derived from the infobase of the Legislative Reference Library of the Alaska State Legislature. Files for previous years that were added to the database were derived from the information booklets available to the general public. There are two important notes regarding the limitations of these booklets: (1) the statutes and administrative regulations in the booklets were excerpted from the official codes on file with the Lieutenant Governor; and (2) the regulations appearing in each booklet may have been changed by emergency regulation or emergency order. As noted in each booklet, there may be errors or omissions that have not been identified and changes that occurred after a booklet was printed (ADF&G 1960-2001). The official code along with emergency regulations and emergency orders can be found on file with the Lieutenant Governor and the administrative offices of the Alaska Board of Fisheries. There was insufficient time to include emergency regulations and orders in the database.

DISCUSSION

Subsistence fishing regulations have been in place since the first set of regulations implemented by the State of Alaska in 1960 following statehood. Yet, there is no comprehensive regulation review of fishery regulations for the Kuskokwim or Yukon River drainage. This is a major data gap in the documentation of subsistence salmon fisheries of these two drainages. There have been some technical reports that have contained regulation reviews for some salmon fisheries in these drainages, such as Yukon Area subdistrict 6(B) (Andrews 1988), Yukon District 4 (Wheeler 1987) and Kuskokwim Area district W-2 (Andrews 1989; Coffing 1991). Each of these reports included information useful for understanding the history and changes in subsistence salmon fisheries by noting the changes in regulations over time. Other earlier studies have described management of the fisheries in a general sense (Pennoyer 1988) and fishing regulations prior to 1961 in the Yukon and Kuskokwim areas (Pennoyer et al. 1965).

This study is a first step toward a complete review of subsistence salmon fishing regulations since statehood. The study focused on the Yukon and Kuskokwim fisheries management areas, as this need was identified first by the federal subsistence regional advisory councils for those areas (USFWS 2001). Since salmon species, are more intensively managed in these areas, this study further focused on subsistence salmon fishing regulations. The study resulted in a searchable computerized database to which can be added the subsistence salmon fishing regulations from other regions of the state. It also created a structure that can be used for creating a searchable database of federal subsistence salmon fishing regulations.

Using the searchable database, the user can research the history of a particular regulation, or changes in regulation of fishing for a specified salmon species in a fisheries management area; or

all regulations in a specified fishing district, as examples. Through such research, the user can determine the progression of subsistence fishing regulations over time. The database also provides opportunity for future study and analysis. For example, one can examine changes in fishing opportunity and restrictions during the past 42 years; and analyze their relationship to other factors such as abundance in salmon stocks; commercialization of salmon fishing; effectiveness of management and conservation plans; and ability to provide for customary and traditional uses since 1960. Further, the database can aid with the evaluation of changes in subsistence regulations and management regimes, by region, salmon species, and over time by serving as a reference source for relevant information.

The database also provides in one place all the regulations booklets made available to the public since 1960. Prior to this study, it has been difficult to obtain the regulations quickly and easily for researching and presenting information on changes in regulations over time. The regulations for the Yukon and Kuskokwim management areas are contained on the CD-ROM that also includes the searchable database. As with the database, the portable document format (pdf) files can be added to as regulations for other fisheries management areas in the state can be easily scanned and included. Similarly, federal subsistence fishing regulations can be included as well, making them easily accessible, searchable, and located on a single disk. Both the searchable database and pdf files can be made accessible to the broader public by making them available over the internet.

The overview of subsistence salmon fishing patterns as described in reports for the Kuskokwim and Yukon fisheries management areas shows the magnitude and significance of salmon for food to rural communities in these drainages. Families in these two areas harvest 45 percent of all salmon taken for subsistence in the state—specifically, 83 percent of all chinook and 62 percent of all chum salmon. Yet commercial fisheries are important also as a mixed subsistence-cash economy is characteristic of many of the Kuskokwim and Yukon drainage communities. This is a primary reason that salmon fisheries management in these areas is particularly challenging. Management must provide for the priority use of salmon for subsistence purposes, and when abundance is sufficient, allow opportunities for other uses, and ensure sustained yield and healthy salmon populations.

CONCLUSIONS

The study resulted in a searchable computerized database with easy-to-use search screens and formats for obtaining current and prior year regulations for the subsistence salmon fisheries of the Kuskokwim and Yukon fisheries management areas. The database provides on a single compact disk a means to obtain information on Alaska state regulations from 1960 through 2001. This information is in two forms: (1) a database for searching regulations by region, year, salmon species, gear type, or text; and (2) a portable document format (pdf) that contains over 50 regulations booklets or their relevant portions. These products resulted in a database structure

that can serve as the structure for producing a database for regulations in other areas of the state and for federal subsistence fishing regulations.

RECOMMENDATIONS

There are several recommendations that are noteworthy, from a technical as well as research and analysis standpoint. From a technical standpoint, the database itself has been developed as a result of this study. Two important additions are now possible. First, since the project resulted in the development of a user-friendly searchable database, the structure developed can be used for creating a database using information on regulations from other areas of the state as well as federal subsistence regulations. The same or similar formatting and programming can be used to expand the database. Second, the pdf files already include regulations applicable to all areas of the state through 1980, so other areas can be added with less investment of time. Similarly, the federal regulations since 1990 can be added in pdf format.

From a research and analysis standpoint, the database provides information for analyzing the opportunities for and restrictions to subsistence salmon fishing in the Kuskokwim and Yukon drainages since 1960. Further, it is possible to use the information to study the effects of regulations, if any, on subsistence fishing patterns in these areas. Such studies would provide a perspective on the extent to which government regulation has provided for customary and traditional uses of salmon for subsistence in the Kuskokwim and Yukon drainages.

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Appendix 1. List of Alaska Fishing Regulations Booklets, 1960-2001 Included in the Database as Portable Document Format (PDF) Files.

Select a Time Period:
2000 through 2004
1990 through 1999
1980 through 1989
1970 through 1979
1960 through 1969

Year	sort	Title	Pgs	File Size
2000-2004		Back to top		
2001-2004	54	2001-2004 Arctic - Yukon - Kuskokwim; Commercial Finfish, Subsistence and Personal Use Finfish and Shellfish Fishing Regulations	155	11.8MB
2000-2001	53	2000-2001 Subsistence and Personal Use Statewide Fisheries Regulations	164	11.5MB
1990-1999		Back to top		
1999-2000	52	1999-2000 Subsistence and Personal Use Statewide Fisheries Regulations	159	11MB
1998-2000	51	1998-2000 Arctic - Yukon - Kuskokwim Region; Commercial, Subsistence, and Personal Use Regulations; Salmon and Miscellaneous Finfish	107	7.9MB
1998-1999	50	1998-1999 Subsistence and Personal Use Statewide Fisheries Regulations	105	9.1MB
1997-1998	49	1997-1998 Statewide Subsistence and Personal Use Fisheries Regulations	95	8.8MB
1996-1997	48	1996-1997 Statewide Subsistence and Personal Use Fisheries Regulations	93	7.6MB
1995-1997	47	1995-1997 Arctic-Yukon-Kuskokwim Region, Commercial Salmon and Miscellaneous Finfish Fishing Regulations	11	1MB
1995-1996	46	1995-1996 Statewide Subsistence and Personal Use Fisheries Regulations	91	7MB
1994-1995	45	1994-95 Subsistence and Personal Use Fisheries	106	8.7MB
1993	44	1993 Subsistence and Personal Use Fishing Regulations	97	6.9MB
1992-1994	43	1992-94 Arctic - Yukon - Kuskokwim Region; Commercial and Subsistence Fishing Regulations; Salmon and Miscellaneous Finfish	85	6.3MB
1991-1992	42	91-92 Subsistence and Personal Use Finfish Fishing Regulations	115	8.2MB

		Appendix 1. continued		
1990-1991	41	1990-1991 Arctic - Yukon - Kuskokwim Region; Commercial and Subsistence Fishing Regulations; Salmon and Miscellaneous Finfish	86	5.5MB
1980-1989		Back to top		
1989	40	1989 Subsistence and Personal Use Finfish Fishing Regulations; Westward, Central and Southeast Alaska	84	7.8 MB
1988-1989	39	1988-1989 Arctic - Yukon - Kuskokwim Region; Commercial and Subsistence Fishing Regulations; Salmon and Miscellaneous Finfish	74	4.6MB
1988	38	1988 Subsistence Finfish Fishing Regulations	47	2.7MB
1987	37	1987 Commercial Finfish Regulations; Salmon and Miscellaneous Finfish; Arctic - Yukon - Kuskokwim Region	68	4.1MB
1986	36	1986 Commercial and Subsistence Fishing Regulations; Salmon and Miscellaneous Finfish; Arctic - Yukon - Kuskokwim Region	64	3.8MB
1986	35	1986 Subsistence Finfish Fishing Regulations	38	2.5MB
1985	34	1985 Commercial and Subsistence Fishing Regulations Salmon and Miscellaneous Finfish Arctic - Yukon - Kuskokwim Region	66	4MB
1985	33	1985 Subsistence Finfish Fishing Regulations	40	2.3MB
1984	32	1984 Commercial and Subsistence Fishing Regulations Salmon and Miscellaneous Finfish Arctic - Yukon - Kuskokwim Region	67	4MB
1984	31	1984 Subsistence Finfish Fishing Regulations	38	2.4MB
1983	30	1983 Commercial Finfish Regulations	12	.7MB
1983	29	1983 Subsistence Regulations	64	4MB
1982	28	1982 Commercial Finfish Regulation	12	.7MB
1982	27	1982 Subsistence Fishing Regulations	63	4MB
1981	26	1981 Finfish Regulations	12	.8MB
1980	25	1980 Finfish Regulations	12	.8MB

		Appendix 1. continued		
1980	24	Alaska Subsistence Fishing Regulations	55	3.6MB
1970-1979		Back to top		
1979	23	Alaska Commercial Fishing Regulations	10	.7MB
1979	22	Alaska Subsistence Fishing Regulations	41	2.6MB
1978	21	Supplement to Alaska Commercial Fishing Regulations Finfish	9	.6MB
1978	20	Alaska Commercial Fishing Regulations	102	6.8MB
1977	19	Alaska Commercial Fishing Regulations Finfish	79	5.7MB
1976	18	Alaska Commercial Fishing Regulations Finfish	84	5.5MB
1975	17	Supplement to Alaska Commercial Fishing Regulations Finfish	18	.9MB
1975	16	Alaska Commercial Fishing Regulations Finfish	118	2.2 MB
1974	15	Alaska Commercial Fishing Regulations	168	9.9MB
1973	14	Alaska Commercial Fishing Regulations	167	9.4MB
1972	13	Alaska Commercial Fishing Regulations	157	9.5MB
1971	12	Alaska Commercial Fishing Regulations	160	9.2MB
1970	11	Alaska Commercial Fishing Regulations	136	7.9MB
1960-1969		Back to top		
1969	10	Alaska Commercial Fishing Regulations	137	8.3MB
1968	9	Alaska Commercial Fishing Regulations	140	7.6MB
1967	8	Alaska Commercial Fishing Regulations	72	4.4MB

		Appendix 1. continued		
1966	7	Alaska Commercial Fishing Regulations	122	7.3MB
1965	6	Alaska Commercial Fishing Regulations	127	7.1MB
1964	5	Regulations of the Alaska Board of Fish and Game for Commercial Fishing in Alaska	128	7MB
1963	4	Regulations of the Alaska Board of Fish and Game for Commercial Fishing in Alaska	122	7MB
1962	3	Regulations of the Alaska Board of Fish and Game for Commercial Fishing in Alaska	182	11MB
1961	2	Regulations of the Alaska Board of Fish and Game for Commercial Fishing in Alaska	117	6.4MB
1960	1	Regulations of the Alaska Board of Fish and Game for Commercial Fishing in Alaska	96	4.9MB

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